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Investigation of novel composites as backfill materials in radioactive waste disposal facilities

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The work aims to assess a novel prepared composite of Poly Acrylic Acid/Charcoal/Montmorillonite (PAACM) as a backfill material for radioactive waste disposal facilities. Characterization of the prepared composite has been done using Fourier Transform Infrared Spectroscopy (FTIR), Thermal Gravimetric Analysis (TGA), Energy Dispersive X-ray (EDX), and Scanning Electron Microscopy (SEM). Cs⁺ and Sr²⁺ ions were determined using Inductive Coupled Plasma (ICP). Some factors which may affect in the sorption process such as contact time, pH of the aqueous phase, mass of the sorbent, competing ions and temperature of the aqueous medium has been studied. The obtained data show that the sorption process is rapid and the PAACM composite has a high sorption capacity towards Cs⁺ and Sr²⁺ ions, the PAAMA has high thermal stability, and the PAACM has highly enormous swelling properties. The swelling of PAAMA is pH and temperature dependent; of the aqueous phase. K⁺ and Ca²⁺ ions are good competing ions for Cs⁺ and Sr²⁺ ions, respectively, during sorption process. Application of the principles of radioactive waste management requires the implementation of measures the activity level of radioactive waste that afford protection of human health and the environment, now and in the future. The prepared material contributes in the protection of the environment and groundwater from contamination with both radio-Cesium and radio-Strontium.

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